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WALKER LEE CISLER

THE ELECTRIC POWER INDUSTRY AND THE AMERICAN COMPETITIVE ENTERPRISE SYSTEM—PAGE THREE

Vol. 9 MAY, 1957 No. 12

Planned Pioneering

At New Products Corporation...
Is Typified by the Quality of

NPC Die Castings

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- **ZINC**
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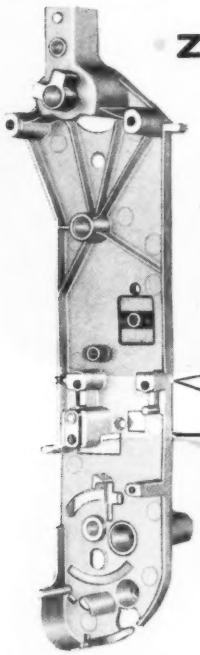


HIGH FIDELITY PHONOGRAPHS


CAMERAS


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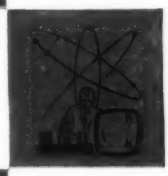
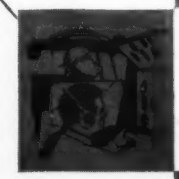

ELECTRONICS


HAND TOOLS


OFFICE EQUIPMENT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May, 1957 Vol. 9, No. 12

CONTENTS

COVER STORY

Walker Lee Cisler, 1957 recipient of the Washington Award, appears on this issue's cover. Mr. Cisler is president and a director of the Detroit Edison Company. He is considered one of engineering's greatest members. Please see pages 3 and 16 for more about the Washington Award.

Free-Free Field Trip July 27, 1957

Members of Western Society of Engineers have been invited to be the guests of the Milwaukee Road for a Field Trip to the Bensenville Yards on July 27, 1957.

This trip is a "MUST" for anyone interested in transportation and should be of particular interest to shippers because of what the Milwaukee Road is doing to give better service through the speed-up of car classification, and minimizing of damage to the contents of cars through the use of retarders.

A special train will leave the Union Station at 9:30 A.M. (Daylight Saving Time) for the trip to Bensenville and will return about 1:30 P.M. The trip will be limited to 150 persons. To get in on this interesting and informative excursion, all you need do is fill out the coupon below or call the Society at RAndolph 6-1736 NOW. The Railroad has requested that we set a minimum age of 18 and that women taking the trip come casual—with slacks and flat-heeled shoes preferred.

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The Electric Power Industry and the

American Competitive Enterprise System

By Walker Lee Cisler

May I tell you that I am deeply touched by the honor that you have bestowed upon me tonight. It is a distinction that I will always cherish with full humility, realizing that one individual's efforts do not stand alone.

Whatever I have endeavored to accomplish has been done with a feeling of mutual effort with many of you who are in the engineering profession, and with help from our colleagues in science, industry, education, finance, law and government. I have always wished to work as a member of a team.

And beyond this number I salute many more who share our concern for human well-being and who hold the belief that democratic institutions and a highly productive business system, energized by an efficient electric power industry, are among the guardians of our human freedom.

There are two main ways in which a nation's efforts can be coordinated.

One approach, which has had an unhappily pervasive influence on the earth in recent years, is ancient tyranny brought up to date by modern science and a new paganism. Under this system a central government, given absolute control and pseudo-deified by emotional propaganda, plays with the fortunes of men and industries as if they were pawns on a chessboard — too often a bloody chessboard.

Such a system cares little for human liberties. It promises rewards for blind obedience and punishes personal enterprise. Because such a system makes poor use of its human resources, we have reason to believe that in the long run it must defeat itself. Its temporary successes, within its own borders and to a lesser extent in the international field, are no greater than its ability to inspire fear.

The Better Approach

There is, of course, the second and better approach to coordinate a nation's efforts. This is the way of Washington, Jefferson and Madison, who gave intellectual expression to the aspirations of a young nation of individualists who had come a long way to make their great experiment in human freedom.

I would like to talk briefly this evening about how well this experiment has turned out. I would also like to avail myself of the privilege that Americans have always exercised freely—the right to point out threats to our basic freedoms whenever they appeared. Such a threat has become apparent during the past quarter century in the electric power field. It is the threat of an expanding public ownership movement which could bring our entire electric power industry under government ownership with ultimate consequences that are not yet clearly seen by most people. Because every American is dependent upon electricity in various ways, this socialistic threat to a vital industry is a threat to him personally.

One reason why the American freedom experiment has been so successful is that it has permitted change in our social institutions under the wings of great and unchanging principles. Let me quote Thomas Jefferson in this respect. He said:

> "Laws and institutions go hand in hand with the progress of the human mind. As that becomes more developed, more enlightened, as new discoveries are made, new truths disclosed, and manners and opinions change with the change of circumstances, institutions must advance also and keep pace with the times."

This we in America have done—and I would not want to be misunderstood as being one who is making a fundamentalist appeal to the precise viewpoint of the founding fathers, who lived in an agrarian rather than an industrial age. This is important because when an industrialist speaks of the American tradition, it is often assumed that he is taking a *status quo* position. This is far from my intention.

We are agreed, I think, that the nation's laws and institutions have moved with the times. Our concepts of private enterprise have also matured and broadened. The managements of responsible corporations today give much thought to their responsibilities to an expanding, democratic society. American capitalism is an evolving capitalism that serves the people better all the time. It is truly a people's capitalism through direct ownership of stock and through the indirect investment of their savings and insurance funds. The independent electric companies are good proof of this typically American contribution to the ways of civilization.

The more I study the problem the clearer it becomes that the welfare of the public and the welfare of business are interrelated and inseparable. If we could only help more people to understand this basic fact, then politicians, who always seek to reflect public opinions to win elections, would be forced to bring their economic concepts up to date. This is where you and I have a great responsibility. We must stand up and speak as clearly as we can on the political, social and economic questions of our time. You will find that they are closely related to your business and personal affairs and there is no such thing as standing aside from political debate.

Let us never be apologetic of the fact that we are businessmen. We stand in a great American tradition that has shown

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Mr. Cisler, president and director of The Detroit Edison Co., presented this address in Chicago on Apr. 27, 1957. It was on the occasion of his receipt of the 1957 Washington Award.

Every road earns money—in gas taxes and license fees paid by drivers using it. The more vehicle miles of traffic handled, the more money earned.

The road pictured is U.S. 66 near Waynesville, Mo. It carries a daily average of 6,450 vehicles, many of them commercial. Here's how the earnings of this concrete road are computed:

Vehicles traveling this road per day	6,450
Times average vehicle tax per mile in Mo.	$.00568
Equals earnings per day per mile	$ 36.64
Times the number of days in a year	365
Equals annual earnings per mile	$13,374
Minus the annual cost to build and maintain such a road during its expected lifetime	$10,000
Equals annual net profit per mile	$ 3,374

Similar analyses elsewhere show that concrete roads earn the most "profit." That's because they attract the most traffic and have the lowest maintenance cost, the longest life and the lowest annual cost.

These factors are more significant than ever under the Federal-Aid Highway Act of 1956, especially on the National System of Interstate Highways.

With 90% of the cost of these roads being paid by the federal government, states will want the best pavement. That's concrete. Its rugged durability makes it the most durable of pavements. Its life expectancy is at least 50 years.

Once built, these roads must be maintained by the state—a good reason for choosing a pavement with a proved record of low maintenance cost. That's concrete. Records from the 24 states keeping such data reveal that concrete costs an average of 26% to 59% less to maintain than other pavements.

Yes, more than ever concrete is the logical choice for all main roads to be built in the biggest road building program ever undertaken in this country.

what the dynamics of personal initiative can accomplish for the citizens of a great democracy. With only six per cent of the world's population and seven per cent of its land, we have forty-one per cent of the world's electric power. Because energy and production go together, we produce and consume more than a third of the world's goods and services. Our factories turn out almost half of the world's products and millions of people are employed in doing it.

Such an achievement takes much more than raw materials or a governmental directive. It requires an advanced technology—and this, in the final analysis, is something that Americans carry around in their heads. We have the most skillful population that you could find anywhere. The atmosphere of freedom encourages Americans to use their heads, to suggest new ideas, to develop better methods, new products, even new technologies to advance our standard of living.

It is evident that a great potential inherent in the human race finds expression in our nation. We live in an intellectual and political climate that is favorable to the full use of our talents and our society encourages free inquiry and affirms the rights of initiative. The patriots of our American tradition handed down to us a system of competitive enterprise that rewards progress and achievement—not in subsidies and special government funds, but in sales to customers who know a good product and a good price when they see it.

How Did It Happen?

Just how did all this happen? Like so many great things, it started in the minds of dedicated men. The early settlers came to these shores in protest against restraints that lay heavily upon them in Europe. They brought to the wilderness the ideas, weapons and tools of an advanced western civilization and they developed that interesting personality, the American frontiersman. Self-reliance was the only possible way of life under such hazardous conditions. Clinging to what was good in their past and leaving the old behind them, they eventually created a really new form of government.

On July 4, 1776 a unanimous Declaration was proclaimed by the thirteen colonies of America. The words of the Preamble ring to this day with the typically American belief that men possess inalienable rights which government cannot remove. Eleven years later, when freedom had been won and the States saw the need for a more perfect union, a convention was called in Philadelphia to revise the Articles of Confederation. As you know, the delegates brought forth our Constitution which is now the oldest written constitution in the world.

Since the founding fathers had a fundamental distrust of government, they set up a federal system restrained by elaborate checks and balances. They divided executive, legislative and judicial functions and immediately amended their own document with a Bill of Rights.

What they had accomplished was to establish a limit to government with such a separation of functions that tyranny would be exceedingly difficult, if not impossible. They established, above the law, the finest expression of principles of human freedom that had ever been enunciated by any civilization. It could only have happened in the New World, which

appeared to some like a second Eden, a new chance for humanity. John Adams called it "The best opportunity and the greatest trust . . . that providence ever committed to so small a number since the transgression of the first pair."

Some at the time, including several of the founding fathers, doubted whether it would work, but time has shown that they came pretty close to inventing the political equivalent of a perpetual motion machine.

It will be worth our while to analyze briefly how it has been possible for our system of government to withstand the buffets that have been encountered. At all times, the struggle of interest-versus-interest has ultimately been referred back to the basic principles of the rights of the individual. Some groups have indeed tried to stampede legislation contrary to the common good. In the long run, however, their energies have subsided in the delays of debate, legislation and judicial review. The checks and balances of government have protected it against itself. The states have been strong and at times the people have spoken aloud. The pressures of truth and fair dealing have had a way of triumphing.

Two Phenomena

In coming down to our own time to discuss some useful facts about the nation's electric power situation, I would like to point out two interesting phenomena that helped to shape American business. Before the American Revolution, the mother country hoped to establish the colonies as a source of raw materials and as a market for her manufacturers. This was a sore point with the colonists and one of the causes of the Revolutionary War. After the war there was a new difficulty. As the industrial revolution developed in England and spread to the United States, there was a lively competition for new ways to make products quickly and cheaply. Many of these, including the manufacture of the common pin, were guarded jealously as if they were highly-classified atomic secrets. Such factors made the small manufacturer and businessman ardent disciples of free enterprise, and opened up the path to our outstanding industrial development.

Another factor that tied in with this was the American enthusiasm for dabbling in science and inventing useful objects. This do-it-yourself movement became fashionable even with our founding fathers. Benjamin Franklin experimented with electricity and risked his life to identify the nature of lightning. He invented the lightning rod and the Franklin stove. The early American, by religion and choice, abhorred idleness and, in his leisure from matters of state or commerce, turned to the construction of useful things. Many gentlemen such as Thomas Jefferson, Samuel Morse and Robert Fulton invented. The Yankee tinker invented. Finally Thomas Alva Edison came along, a genius following in a great American tradition, a beacon light in history.

Electric Power History

The history of the electric power industry is well known to this audience. I have already stated that we have in the United States about forty-one per cent of the world's electric power. You may be interested in hearing just how fast and how far we have gone since 1931. Starting with that year and going by ten-year intervals I will recite the yearly kilowatt-hours produced: 87 billion, 164 billion,

370 billion. That brings us to 1951. The figure for 1956 was 600 billion killowatthours for power systems alone. Industries with self-generation added more than fifteen per cent to these outputs. That in a nutshell is the story of American economic progress. Since it takes several years to build a new power plant, the industry always looks five, ten, twenty-five years ahead. As in the past, our nation's future strength depends very much upon the ability of the electric power industry to continue to meet power demands adequately and economically.

Our generating capacity has been doubling every decade and it will continue to double every 10 or 12 years in the foreseeable future. Kilowatthour production by 1975 will be in the trillions.

This gives the management men in the electric power industry a very challenging assignment. They must guide their companies to the solution of many technical problems in the generation, transmission and distribution of energy. They must also arrange for the financing—and in so doing they must always think in terms of bigger figures in what they do.

There is just one place where they don't want any bigger figures if they can help it—and that is in the price to consumers. As taxes and all business costs continue to mount, they are always on the lookout for better operating efficiencies. I am certain that the independent electric companies will continue to do a good job for the consumer. They will also continue to offer good investment opportunities to the public and to the people who manage the nation's savings and insurance funds. A consideration of all the data at my command leads me to the conclusion that these electric power companies are not only a good example of free enterprise but even indispensable to a continuance of our American traditions of liberty and effective personal initiative.

A Threat

This vital part of our free enterprise system has been seriously threatened for some years by the public ownership movement, supported by powerful groups and by leaders both within and outside of Congress. Their ultimate objective, as I expressed earlier, is to bring the entire electric power industry under government ownership. I doubt whether many people, including most of its supporters, recognize the full implications of such a move, which would be a definite and positive move toward socialism.

My concern is not with any one particular area of public power, nor with those responsible for the construction and operation of public power systems.

I have many friends among them and I intend to continue to cooperate with them to the end that the most effective engineering and management practices be employed in the entire power industry of our country. And I do not take exception to such steps as may have been necessary to bring electricity to certain areas within a reasonable length of time. And further, I am not unduly concerned with many of the municipal public lighting commissions and similar organizations of a strictly local nature that do not benefit from nation-wide tax levies.

Our problem is that of dealing with a dangerous political philosophy completely opposed to those uppermost in the minds of the founders of our country. That philosophy is being used in an endeavor to discredit private industry and to extend government bureaucracy by methods which are entirely foreign to the American way of life.

The smothering effect of socialism on productive human enterprise is clear enough in the experience of several nations abroad. In one instance a government that was not thought of as being far to the left has told private industry that it could not expand further—because the government needed all funds available for investment in government-owned enterprises. In all these countries there is a dearth of capital investment, and money that could work efficiently for human betterment is being taxed away to serve the political purposes of the small group in power.

It is a grave moment indeed when we can see tendencies in the United States that could lead to the same kind of economic insanity at home. The independent electric companies have good reason to view with alarm certain of our federal power projects, which have strange tax advantages—unusual bookkeeping arrangements—and proponents who watch out for them.

Federal power projects make up fifteen per cent of the generation in America today. Their advocates claim that government power is cheap. This is simply not true and based upon all equitable comparisons, it costs at least as much and usually more to produce power in government plants as in those owned by private industry. It is sold below actual cost, however, to the 33 million people who live and work in areas served by such government power projects. You and I and 132 million others help to pay these

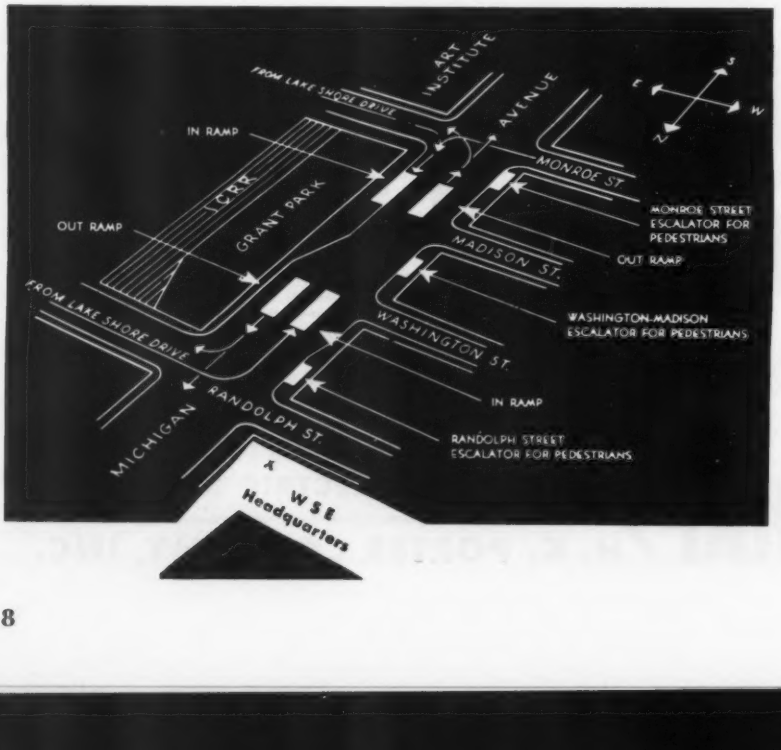
(Continued on Page 19)

SAY, ENGINEER!

Do you like to DRIVE?

Then why not drive to WSE meetings and other functions? There's plenty of PARKING almost at the door—the Underground Garage is diagonally across the street from WSE Headquarters (see the map below), two private garages are a block west, and the State-Wacker "Bird Cage" Garage is only a short distance away.

Below: map showing Park Department Underground Garage



Interior view of Underground Garage

If you're not driving it's still convenient to get to and from WSE meetings.

Here are handy stations or stops:

- The Cab Stand is just across the street
- The Elevated is one block west
- The Subway is two blocks west
- Buses stop at the door or within a few blocks for every part of town
- The IC Suburban station is across the street
- Other suburban stations are conveniently served by bus or elevated.

You see, your WSE Headquarters is at the handiest place in Chicago.

ENTER at either Monroe or Randolph Street on Michigan

EASY access, Speedy exit

ESCALATORS convey you to street level

CAPACITY The garage with its 2359 parking spaces, is designed to prevent overcrowding.

Illinois, Dartmouth Students Win Honors

University of Illinois and Dartmouth College students won top honors in a national essay contest dealing with capital equipment acquisition and replacement.

The third annual competition was sponsored by the National Center of Education and Research in Dynamic Equipment Policy at Illinois Institute of Technology.

Paul A. Van Lierde, University of Illinois, Urbana, was awarded $600 in the graduate division for his essay, "Price Level Changes and Capital Consumption Allowances."

In the undergraduate division, Charles W. King, Jr., Thayer School of Engineering at Dartmouth College, Hanover, N. H., received $400 for his essay, "An Analysis of Truck Refrigeration; Dry Ice Versus Mechanical."

The dynamic equipment policy center was established at Illinois Tech in 1953 in cooperation with the Machinery and Allied Products Institute and the Council for Technological Advancement.

Through its educational and research program, the center promotes scientific methods in analyzing the acquisition of new equipment and replacement of worn-out or obsolete capital goods.

Manuscripts were judged by a seven-man committee selected from industry and the education field for their knowledge of equipment analysis.

The judges included John T. Rettaliata, MWSE, president of Illinois Tech.

The center will sponsor another competition in dynamic equipment policy in 1958.

Aircraft Problem Solutions Suggested

Solutions to two of the knottiest problems facing aircraft designers, landing gear and aerial refueling units, were suggested at a meeting of engineers in San Francisco on June 10.

A new type of landing gear, developed for heavy Air Force cargo planes with a gross weight close to 100,000 pounds, was outlined by R. O. Dickinson, Jr., of the Lockheed Aircraft Corporation, Marietta, Georgia. Instead of the conventional arrangement, the new device features two wheels, one in front of another, as on a bicycle, on each side of the aircraft. This tandem arrangement, the speaker said, promises several advantages including improved reliability, smaller concentration of weight on the runway and a narrower housing when the wheels are retracted. For military airplanes which may operate from hastily prepared fields with soft surface of dirt or sand, the tandem arrangement permits the second wheel to run in the tightly packed track of the first, thereby reducing friction.

Another paper presented at the same session, part of the Semi-Annual Meeting of The American Society of Mechanical Engineers which opened at the Sheraton-Palace Hotel, describes methods used to develop America's most modern aerial refueling devices. The new units are said to permit fighters and bombers to refuel rapidly at higher altitudes and higher speeds than ever before.

Author of the paper is William F. Whitesides, engineering manager of Flight Refueling Inc., of Baltimore, Maryland.

The primary use of aerial refueling today is to increase the range and pay-load capacity of military planes. The newest systems are said to be compact, lightweight, simple and reliable, and to allow a flying tanker to deliver fuel to more than one aircraft at a time, including comparatively small aircraft such as fighters.

'Cold Chlorination' Aids Process

Science has come up with the first change in over a hundred years in the production of a titanium compound vital to supersonic high altitude flight, it has been announced in Chicago.

The compound is titanium tetrachloride, necessary in the manufacture of titanium, a strong, lightweight metal whose alloys have become significant in making jet aircraft, rocket, and missile parts.

Scientists at Armour Research Foundation of Illinois Institute of Technology have developed a way to make it at temperatures much lower than those required for the present method—with a higher purity and at less cost.

The process also opens up new avenues for the use of low grade ores, such as ilmenite, in the manufacture of titanium, according to Clark E. Thorp, manager of the Foundation's chemistry and chemical engineering department.

In addition to its current aerial defense importance, titanium tetrachloride has other uses. Most familiar in form of skywriting, it also has been used as a smoke screening material in military operations, and as a source for organic titanium compounds and paint pigments.

The new process for producing the compound starts with a "cold chlorination" of ilmenite ore at freezing temperatures, where the conventional process requires very high temperatures to chlorinate a high grade ore—rutile.

Since about four pounds of titanium tetrachloride are needed to produce one pound of titanium, use of the more expensive rutile in the old process contributes heavily to the cost of the end product, Thorp said.

In the Foundation's method, the key reaction is the precipitation of potassium chlorotitanate from ilmenite solution and the decomposition of the precipitate into titanium tetrachloride and potassium chloride at candle flame temperatures.

While it will take some time to develop the process fully, it is expected that it eventually will replace the high temperature process now in use.

Patents have been applied for, and Armour Research Foundation is offering the process to industrial sponsors for further development. Further information may be obtained by contacting E. W. Wickert, Manager of Licensing Operations, Armour Research Foundation, Technology Center, Chicago 16.

Here is a brief description of how the process works:

Ilmenite, rutile, or a titanium-rich slag is crushed and ground, then treated with concentrated sulfuric acid.

The iron content of this solution is reduced by two controlled crystallization steps, then the remaining solution, containing predominantly titanium, is treated with hydrogen chloride and solid potassium chloride. Upon further cooling, potassium chlorotitanate precipitates out.

The complex salt of titanium is decomposed, yielding pure titanium tetrachloride after the first condensation of the liquid.

The process, successfully demonstrated in ARF laboratories, will be investigated further for economically feasible methods of continuous industrial production, Thorp said.

Conference Set

The 1957 National Electronics Conference and Exhibit will be held Oct. 7-9 at the Hotel Sherman, Chicago. Last year's meeting was attended by nearly 10,000 scientists, engineers, manufacturers, students, and government officials.

Ship Atomic Plant Is Developed

A new type of compact, lightweight, nuclear power plant suitable for ships and other installations was described Mar. 12 to engineers and scientists attending the 1957 Nuclear Congress at Philadelphia's Convention Hall.

In 1956 many people in the atomic energy field were surprised by the Atomic Energy Commission's decision to construct a closed-cycle, gas-cooled nuclear power plant at its National Testing Station. They knew that the use of this type of reactor to produce power had not been previously taken seriously, for neither the reactor nor its turbine power plant were beyond the study stage.

Today, the reasoning behind that surprising decision was made clear to delegates at the Congress. In a paper written under the sponsorship of The American Society of Mechanical Engineers, engineer Michael Silverberg explained why it seems a good gamble to try marrying a reactor and power plant neither of which has yet been completely proven.

"We do so," said Silverberg, "because the advantages of one complement those of the other so very well." He listed the following advantages of closed-cycle nuclear turbomachinery:

1. Potentially high efficiency, conservatively estimated to be 40 per cent—a relatively high percentage—at a turbine-inlet temperature of 1500° F., and 30 per cent—still an excellent percentage—at the more readily accessible temperature of 1200° F.

2. The most compact, lightweight system possible. This feature is particularly important for marine propulsion units.

3. Simpler and cheaper containment, because less energy is stored in a gaseous coolant than in those liquid coolants that require most other reactors to be enclosed within massive steel and concrete walls.

4. Achievement of maximum efficiency at peak reactor temperatures, eliminating heat exchangers and their inevitable energy losses.

5. Complete control over the release of radioactive gases to the atmosphere, in contrast to some other reactor types.

6. The natural enhancement of the cooling qualities of the gas by the pressurization needed for its turbine use.

7. Permissibility of part-load operation at constant working temperatures and efficiency—a flexibility lacking in some other reactor types.

Silverberg stated that the key to the eventual success or failure of the closed-cycle, gas-cooled reactor power plant is the permissible operating temperature. He acknowledged that the effects of high-temperature operation are felt in many areas, all of which must receive investigation, to determine how many of the basic problems can be solved.

But, said Silverberg, "if most of them can, the closed-cycle gas-cooled reactor should be here to stay."

Action Pictures

Closed-circuit telecasting of hurricane radar maps to East and Gulf Coast stations is being considered by the Weather Bureau, reports *Aviation Week*. The system would permit local meteorologists to view first-hand the progress and development of a storm.

Cool Comfort

Eat and Relax

in the

Air Conditioned
WSE Dining Room Lounge-Bar

For the comfort
of our members and guests—
June 3 to August 30
WSE is providing a lounge-bar
on the dining-room floor (5th).

Sandwich Luncheons
Petite Buffet

All the coffee you can drink!

Come in and
try the new set-up

Atom Mechanisms Are Standardized

Successful standardization of control mechanisms for nuclear research reactors was described Mar. 14 to delegates at the 1957 Nuclear Congress. The new development gave members of the cost-conscious atomic industry welcome visions of enjoying the savings of mass production. They also looked forward to avoiding a current waste of expensive engineering talent on the design of unnecessarily individual reactor-control mechanisms.

A control-rod drive mechanism is a device that holds the power level of a reactor within safe limits by varying the amount of neutron-absorbing material in its core. Since no two reactors are identical, it has been customary to design and fabricate a new control mechanism for each new reactor.

Actually, much of this effort has been unnecessary, since all control mechanisms must incorporate the same operating and safety principles. The amount of wasted work involved is indicated by the fact that over 200 reactors of all types and sizes have been built or are in the building or planning stage.

The control mechanism described is a package of standardized components, each designed to perform a specific necessary function. By combining the components in various ways, many different types of drive mechanisms can be assembled. The package is thus easily modifiable to fit many types of reactors.

News of this achievement was contained in a paper written under the sponsorship of The American Society of Mechanical Engineers, one of the 25 engineering and scientific groups participating in the 1957 Nuclear Congress.

The engineer authors of the paper, Gilbert Rolan and Charles Hinrichs, report that the housing of the drive mechanism was one of the most difficult components to standardize. Unlike the other components, the housing requires a few modifications in order to be used with other types of reactor than the one for which it is best suited, the swimming-pool reactor.

(A "swimming-pool" reactor is a low-power research reactor with fuel elements suspended in a deep pool of water. The water moderates the nuclear reaction, cools the radioactive material, and shields the site from radioactivity—three functions usually performed by three different materials in other types of reactors. This simplicity has made the swimming-pool reactor a favorite research installation. India's first nuclear reactor, which went into operation in Bombay last August, is of the swimming-pool type.)

Rolan and Hinrichs explain that their control-rod drive mechanism is electromechanical, rather than hydraulically or air-controlled, because electromechanical controls predominate in existent reactors. They also claim that ease of positive and precise control is greatest with electromechanisms.

Executives Featured

Top industrial executives and the secretary of the Air Force were featured speakers at the National Industrial Research Conference in Chicago on April 24 and 25.

Sponsored by Armour Research Foundation of Illinois Institute of Technology, the conference served as the focal point of National Industrial Research Week, April 21-27.

More than 500 industrial executives were expected to attend the two-day meeting in the Conrad Hilton Hotel, according to Dr. Christopher E. Barthel, Jr., conference chairman and assistant director of the Foundation.

The conference employed "Research for Profit" as its theme and it dealt with management-level decisions on research and development, Barthel explained.

Three general sessions were devoted to "Sales Growth through Research," "More Research for the Dollar," and "Extra Dividends from Research."

Key speakers were: Bennett Archambault, president, Stewart-Warner Corp.; John T. Rettaliata, MWSE, president, Illinois Institute of Technology; Robert S. Ingersoll, president, Borg-Warner Corp.; Robert B. Semple, president, Wyandotte Chemicals Corp., and Donald A. Quarles, secretary of the Air Force.

Quarles described the government's gains from industrial research when he addressed the conference at the April 25 luncheon.

Other speakers included: Wilbur H. Armacost, vice president, Combustion Engineering, Inc.; James H. Binger, vice president, Minneapolis-Honeywell Regulator Co.; Victor Conquest, vice-president, Armour and Co.; Ralph E. Knight, vice president, Kaiser Aluminum & Chemical Corp.; C. F. Rassweiler, vice-chairman of the board, Johns-Manville Corp.; E. Duer Reeves, executive vice president, Esso Research and Engineering Co., and W. Furness Thompson, vice-president, Smith, Kline & French Laboratories.

Guided Missiles 'Fly' in Chicago

Airplanes and guided missiles are being flown inside a laboratory on Chicago's near south side.

The planes and missiles, as well as flying conditions, are being simulated, that is, by the use of models.

Engineers at Armour Research Foundation of Illinois Institute of Technology are using simulation techniques preliminary to undertaking expensive engineering projects to avoid costly mistakes and to obtain design information, according to Dr. Shizuo Hori.

As supervisor of the control systems section of the ARF electrical engineering research department, Hori is responsible for the Foundation's missile simulation and analog computer facilities. He currently is heading work on a simulation facility for assessment of airborne systems.

There are many stages in the development of the complex system of a missile, Hori explained.

"Physical simulation may be one step which has the advantage of laboratory conditions but enables the study of the complete system under conditions approximating those during actual flight," he said.

Many of the problems encountered in flights would be solved in the laboratory through simulation, thereby resulting in a saving of time and money.

"Analog computers are one of the basic tools of simulation," Hori stated.

"An analog computed model can be set up in relatively short order. Its inherent flexibility admits rapid and systematic investigations of variations in the basic system.

"Many problems which would be difficult or impossible by manual computation," he said, "can be handled in almost routine fashion by analog simulation."

The use of models as engineering aids probably is as old as engineering itself.

Models were used even in ancient times, according to Hori. Models of terrain (maps) were used in civil engineering projects. Modern usages include model aircraft to determine stability of proposed airframe designs and model dams to predict water seepage.

Many simulation techniques have been employed successfully at Armour Research Foundation, Hori pointed out, citing as examples the study of missile guidance systems and hydraulic servo valves.

One of the underlying reasons for using simulators, according to Hori, is to reduce the cost of system development. Savings may result from one or more of the following:

—Avoiding mistakes leading to destructive instability or inadequate performance.

—Obtaining information which could not be had or would be difficult to get by other means.

—Saving time and engineering effort which otherwise would not be expended in slower analytical or graphical analysis.

—Determining the feasibility of systems that would be too expensive to construct without some assurance of success.

—Enabling the performance of more meaningful field tests by virtue of additional insight provided by simulation.

—Reducing the number of field tests necessary.

Ball-points Roll Ahead

While fountain pen shipments manage to maintain an even keel, ball-point pens continue to forge ahead. Today they account for over 80 per cent of mechanical writing equipment, and may well hit a 250-million peak this year, reports *Chemical Week*.

Valve Men Solve 'Hot' Problems

The American valve industry, which has cooly solved the problems of piping such thermally hot fluids as saturated steam and cracked petroleum, is warmly engaged in solving the problems of piping such radioactively "hot" fluids as molten sodium and dissolved plutonium.

Delegates to the 1957 Nuclear Congress heard on Mar. 12 how a variety of ingenious fabrication and inspection methods were making it hot for the radioactive gremlins who want atomic power-plant valves to corrode, have seal leaks, and be porous.

It is vital to catch and remedy all such defects before valves are installed in the piping systems of atomic-energy plants, lest the spread or loss of radioactive fluids cause reactor "scram"—the sudden and expensive shutting-down of a nuclear reactor for safety reasons.

Almost literally fighting fire with fire, valve engineers use deadly gamma rays emitted by radioactive cobalt-60 to make radiographs that, like those made with X-rays, reveal internal valve defects invisible to external inspection.

Going to the other temperature extreme, valve engineers resort to freezing cold in their attempts to keep atomic power-plant valves from developing leaky seals. Some of the radioactive fluid to be piped—as, for instance, liquid sodium—may be frozen to form the valve seal. This seems like a practical application of the old physics-classroom riddle, "What would you keep the perfect solvent in?" to which the answer is, "In a container frozen from itself."

Such extreme recourses have necessarily meant that atom-power valves and pipe fittings cost more than their less critical counter-parts in normal-power piping. In a report read today to the 1957 Nuclear Congress, the engineer J. J. Kanter said that much of the expense being built into these valves is dictated by caution.

Kanter's report was sponsored by The American Society of Mechanical Engineers.

"As experience is gained," Kanter went on to say, "it is to be expected that piping components utilizing . . . designs lending themselves to economical production will emerge."

EJC Commission Reports on Colleges

One of the largest freshman engineering classes (second only to the 1946 class —with the large G.I. influx) enrolled in the engineering colleges of the country in 1956. There is no evidence that qualified students are being turned away from engineering colleges and currently there is no shortage of engineering students. Although beset with serious problems, notably faculty availability and student selection, our engineering educational facilities have, in general, comfortably assimilated this enrollment.

These conclusions are a result of a survey recently completed by the Engineering Manpower Commission of Engineers Joint Council. Replies were received from 169 colleges with about 90% of the country's 1956-57 freshman engineering enrollment.

The fourteen page report evaluates the current available engineering educational facilities, freshman capacity and enrollment, and capacity expansion programs underway across the nation. The data are classified by considerations of accreditation (by Engineers' Council for Professional Development) and of control (private and public) as well as by geographic location of colleges.

The report of the survey—"Engineering Educational Facilities" — 1957 (report 104) is available at Engineers Joint Council.

Above, left to right, Dr. Robert E. Wilson, recipient of the Washington Award in 1956; John T. Rettaliata (WSE); Walker Lee Cisler, recipient of the 1957 Award; and George L. Jackson (WSE). They are looking at the plaque, the token of the Award.

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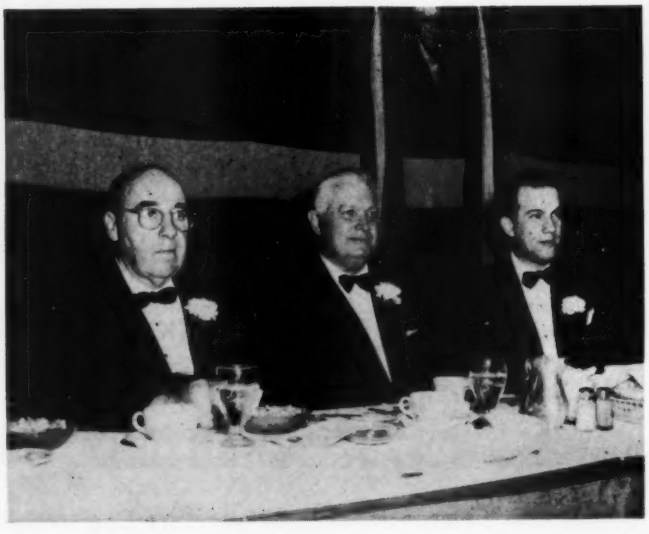

The Washington Award for 1957

Walker Lee Cisler, president and a director of the Detroit Edison Company, on April 22 at the Furniture Club of America in Chicago, was presented the Washington Award for 1957.

The meeting was called to order about 8 p.m. and those in attendance were greeted by Chairman John T. Rettaliata, of the Western Society of Engineers.

The representatives of the participating societies were then introduced, as was Dr. Robert E. Wilson, 1956 recipient of the Award.

Chairman Rettaliata then reviewed the Washington Award and its meaning, and spoke of Mr. Cisler's high qualifications. Following this, William Pletta, ASME, speaking for the participating societies, spoke concurring in Mr. Cisler's selection.

George L. Jackson, 1956-57 president of the Western Society of Engineers, then presented Mr. Cisler with an engraved plaque, the token of the Award. Mr. Cisler then made his address (see page 3), after which the meeting was adjourned.

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Above: George L. Jackson (WSE), J. H. Foote (AIEE), and William Pletta (ASME).

Left: Harold F. Sommerschield (ASCE), Michael Tenenbaum (AIME), and William R. Marston (WSE).

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Power Industry

(Continued from Page 7)

electric bills. For example, government power is sold to industry in some areas at rates ranging from 30 to 45 per cent below the national average. This can be done because such power is subsidized out of the nation's taxes.

Such public power projects do not recover all legitimate costs from their power sale. They pay no federal taxes—only token state and local taxes—and often virtually no interest or carrying charges on invested capital.

On the other hand, these are major items of expense to independent power companies like Detroit Edison.

In 1956, for example, we paid $24.1 million in federal income taxes—$20.9 million in property and other taxes—$34 million for the use of the investors' money—a total of $79 million.

If the federal power establishment, which is roughly eight times the size of Detroit Edison, had to pay eight times this amount, or $632 million in interest and taxes for the year, the myth that such federal power is cheap would soon fade away.

Because public power does not bear its fair share of the tax burden, all other American taxpayers make up for the apparent cheapness of public power rates in their own increased taxes. Let me give you some idea of how much this has affected the taxpayer in Michigan alone and then figure out the national bill for yourself. In the past twenty years, Michigan taxpayers have contributed about $185 million to help build government power facilities. During the coming twenty years, unless the trend is halted, public power plans for further expansion will cost Michigan taxpayers about $800 million more.

A lot of money is involved here, but that is not the major consideration. The federal power push is clearly a special interest deal that is contrary to our American ground rules for fair play. Much of the activity is nurtured behind the scenes in various bureaus and other organizations. The sponsors seldom have to come before the forum of American opinion for a direct answer on their plans. Many of the arguments that you hear in its favor are emotional appeals that can only be countered by a rather dry recitation of financial and legal facts. Surveys by the most competent organizations have repeatedly shown that the large majority of our population do not want our government to be engaged in business.

A Difficult Story

Admittedly, ours is a difficult story to try to get across to the American people and even our hardworking legislators in Washington cannot always spare the time to become expertly informed in all these matters. Many of the proponents of an expanded federal power system are genuinely convinced that they are championing a progressive cause for the good of the nation. Naturally I respect their right to such an opinion.

But, I would like to quote a statement made in 1925 by Carl D. Thompson, noted socialist and public power advocate who played a leading part in the federal power expansion activities until his death in 1947:

> "The movement for public super power becomes the most vital phase of the public ownership movement. The control of electric power will obviously carry with it the control of the industries of the nation, the control of transportation, of mining, of agriculture. It will also dominate and determine very largely the domestic life of the people."

Obviously, there are those today who hold to this same philosophy.

It is clear to me that here is an issue deserving the close attention of every American, because his children will have to live with the results.

If any decisive effort were made some day to nationalize the electric power industry, or other industries, there would be repercussions along our entire economy. This would be a matter of grave concern to businessmen, union members, every employe and investor, every last individual with a bank account or an insurance policy. In a nation that justly prides itself on diversity of opinion, it is not surprising that there are people who favor such a grandiose climax to their utopian dreams.

About Atomic Energy

Because I am often asked how the nation is doing in atomic power, I would like to close with a few observations on this challenging and hopeful subject.

Since the Atomic Energy Act was reenacted in 1954, it has become possible for American industry to begin working on power reactor development, in effective partnership with government through the Atomic Energy Commission. A thorough job is being done to solve the complex physical problems involved in the design and operation of many types of reactors. This is most important because it is still too early to decide which of the great variety of possible reactor concepts are most practical from the scientific viewpoint and the most promising economically.

Nevertheless, it is now well established that the diverse problems of nuclear power are being solved in the United States by this effective mobilization of our scientific and management manpower.

We are taking a strong lead in helping other nations in the free world to understand the technical problems and to find out how nuclear energy can best fit into their own economy. By virtue of our broad approach to the whole field of nuclear possibilities, other nations are looking to us for the most advanced and far-reaching nuclear concepts.

We have not entered into any kilowatt race to demonstrate, by sheer number, that we can build a lot of reactors based on a few designs. If we had done this, we would have squandered our production facilities and technical abilities on a mere feat of mass production prowess. Instead, we have deployed our intellectual and physical resources over the broad field of imperative research and development.

Private industry's progress during the two and a half years since the passage of the 1954 act has won international respect among the experts most competent to judge in these matters. Under the commission's power demonstration reactor program and independent industrial programs, private and public groups are at work on fourteen large reactor projects, of which seven are scheduled to be in partial or full operation by the end of 1960. They will have a total capacity in excess of 1.5 million kilowatts and involve expenditures approaching $500 million. As studies progress, additional projects undoubtedly will be scheduled for construction. Mankind should achieve an indefinite postponement of the energy crisis that appeared inevitable with the dwindling away of the world supply of coal, oil and gas. Uranium supplies are at least 23 times as large.

Long before these are gone, we will certainly have further means of unlocking nuclear energies. At least one of these, the so-called thermo-fusion process, is in the experimental stage in the United States right now.

How does atomic power enter into the private-versus-public power situation? Until recently, most public power was derived from hydraulic developments and therefore was somewhat limited in scope. Atomic power plants can be built anywhere and there are strenuous endeavors on the part of some to have the federal government engage in a large program of building plants in different parts of the country.

The need to accelerate atomic power development is usually given as the justification for such a program. I believe, however, that any impartial review of the situation will reveal that the power industry consistently has undertaken the construction of different reactor types as soon as the technology is sufficiently advanced. It would be a waste of valuable materials and talent to undertake duplicate projects which would not appreciably advance the art.

Obviously the sale of power from government-built plants would be in accordance with the "preference clause" which reserves to public power systems all of the subsidized cost advantages of governmental projects, and denies such benefits to independently-owned systems except where public power system customers cannot be found.

The preference clause of the Atomic Energy Act of 1954, as I have indicated, provides that

> "In contracting for the disposal of such energy, (i.e., produced in government owned atomic power plants), the commission shall give preference and priority to public bodies and co-operatives . . ."

There is more to the story than this, but this is the part that is being used to the disadvantage of the independent power industry.

The thought of course is that only governmental bodies and their power customers should benefit from the public funds invested in power facilities.

The logical question is — why should benefits resulting from governmental financing methods be denied to the customers of investor owned power systems whose rates include an increment for the payment of the taxes used to construct the government-owned plants.

This threat to the independently-owned electric power industry through atomic energy is far more serious than generally realized. The industry is faced with the

need to raise very large amounts of new capital to meet the increasing requirements for electricity. So far, it has ably succeeded in maintaining the sound financial conditions required to make this possible. At the same time, a major segment of the industry has undertaken the expenditure of large sums for atomic power development. It will be some years before there can be any return whatever from such expenditures.

The extension of public power into new areas could seriously threaten the future of the entire independently-owned power industry, and this in time could rapidly extend to other industries, as has happened in so many overseas countries. Although the electric power industry is in a strong condition, we would be failing to meet our responsibilities as citizens if we failed to recognize and call attention to the threats which are so obvious to those who are close to the picture.

Of one thing I am quite positive. In the nuclear power field and in the supply of abundant elecricity, American industry, God-willing, shall always demonstrate our democratic strength by its accomplishments. Our nation shall use this energy in the name of human freedom and progress.

It all began with men like George Washington, and his spirit will continue to inspire men in ages yet to come.

Barker and Hooven Issue Joint Statement

Dr. J. W. Barker and Mr. M. D. Hooven, president respectively of Engineers Joint Council and Engineers Council for Professional Development, in a joint statement on May 28 announced in New York the scheduling of the Engineers General Assembly, a conference of the two organizations, for Thursday and Friday, Oct. 24 and 25, at the New York Statler Hotel.

The Assembly constitutes the first organizational step in the coordination of the activities of EJC and ECPD, as a recognition of the essential unity of the profession and of the common goals of the two major engineering organizations.

The statement further reads:

"The EJC-ECPD joint program committee has developed an outstanding program that will reflect the common interests of the organizations in the professional and social development of the engineer. The two groups have long recognized their closely paralleled activities and we are delighted at this singularly important step in bringing together their annual meetings and in providing a fully integrated program for the profession.

"The joint committee will issue shortly further details on the program and speakers, including the main social function—The Assembly Dinner, which will recognize particularly ECPD's 25th anniversary."

The ECPD is a conference of engineering societies with the National Council of State Board of Engineering Examiners and the Engineering Institute of Canada, primarily responsible for accreditation of engineering college curricula and for the early career development of the engineer.

EJC is a federation of 15 major engineering societies with a combined membership of 250,000 and represents the engineer more fully as a degree-holding professional.

Ceramic Cutting Tool in Spotlight

One of the most significant tool engineering developments in recent years —ceramic cutting tools—shared the technical program spotlight when the American Society of Tool Engineers observed its 25th Anniversary this March, in Houston, Tex.

As part of a special program marking 25 years of service to industry, the public and the tool engineering profession, ASTE presented a "Ceramic Tooling Symposium."

The Symposium, co-sponsored by the Massachusetts Institute of Technology, Ohio State University and the Warner and Swasey Company of Cleveland, Ohio, reported on the latest research developments on ceramic tools and on attempts to adopt this new material to production problems. The nine papers selected for reading at the symposium will be made generally available in book form.

The many practical advantages of ceramic cutting tools—among which are their resistance to softening under high temperatures, their hardness, ease of forming, low co-efficient of friction and low-cost-availability—offer great possibilities, if their practical disadvantages can be overcome. Many laboratory applications have been quite successful, as were illustrated in the Symposium.

Intermittent research begun approximately 25 years ago in European and American Industry, has erupted into large-scale experimental study by industries and universities in this country and and in Russia. Some outstanding applications of ceramic tooling by Russia have already been reported.

Among the earliest successful experiments in ceramic tooling were those conducted by U. S. Army Ordnance during World War II, while searching for substitutions for strategic materials. H. E. "Rip" Collins, first vice-president of ASTE, was among the first to recognize the possibilities of ceramic cutting tools, and brought to this country some of the earliest information about the progress being made in this field by English industry.

A display of ceramic tools and specially-adapted equipment was also featured at the Symposium.

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Three-Dimensional Engineers Needed

Frederick R. Kappel, president of the American Telephone and Telegraph Company, said in New York on Jan. 21 that business needs "three-dimensional" engineers and that business can do much to help develop them.

In a talk before the Winter General Meeting of the American Institute of Electrical Engineers, he said the engineer acquires in college the first dimension—learning to move in a straight line in his first particular field. The second dimension is the broadening that comes through continued training and self study. The third is the "height" attained from mingling engineering and management ideas so that the engineer's understanding of the problems and requirements of his business makes him more effective in that business.

"Industry can contribute much, especially to the second and third dimensions," Kappel stated. He said that putting engineers in compartments and shutting them off from the rest of the ship will not produce the engineers industry is looking for to take on responsible management jobs.

"In this dynamic and expanding world," he said, "the competent engineer has to lead a dynamic and expanding life. In my judgment there is simply no room left for any routine approaches to engineering, or for standing still with the mental equipment we've got. The engineer has to grow and change with the times and constantly equip himself to handle new problems. He has to nourish his mind and broaden his outlook to make sure that neither gets obsolete."

The Bell Companies, he added, are attempting to provide engineers with full opportunity for education and growth. Special training courses have been set up within the Bell System and in certain cases tuition is paid by the companies for study in colleges and universities.

"Because of the effort we're making," he pointed out, "we're getting a wonderful amount of fine engineering work done that otherwise could never have been done so soon or so well. More than that, with a wider appreciation by other people in management of the engineer's contribution, I'm confident we're getting a better team and a better overall job. And I am equally confident that our engineers are profiting in prestige, promotion, and salary rewards as a result."

Floating Holidays

Three "floating" holidays a year have been given employees of a Chicago firm, *Chemical Engineering* reports. The flexible system allows an employee to take these days off singly or use them to extend his regular vacation.

Harrington Announces Education Conference

J. Earl Harrington, executive secretary of the Western Society of Engineers announced in New York City on May 20 that the Western Society will provide local sponsorship in Chicago for a comprehensive conference on the fundamental status of higher education in relation to engineering, science and technology. The meeting will be held at the Edgewater Beach Hotel in Chicago, Oct. 31, Nov. 1 and 2, 1957. It will be sponsored by the Engineers Joint Council, the Scientific Manpower Commission, the National Science Foundation, and the National Academy of Sciences — National Research Council.

The theme of the National Conference will be "Engineering and Scientific Education — Foundation of National Strength."

According to Harrington, the Conference will:

1. Provide an up-to-date picture of the technical manpower problem and its implication for educational resources.
2. Highlight the unique problems of higher education in engineering and science and explore remedial measures.
3. Contribute to general understanding of problems of higher education in technology and the need to rally our Nation's resources to meet the challenge.

Harrington indicated that program planning is well along and that an outstanding group of educational, industrial and governmental leaders is being assembled. Dr. Lee DuBridge, president, California Institute of Technology will deliver the keynote address.

Reviews of Technical Books

Manufacturing Processes

Manufacturing Processes, by Myron L. Begeman, John Wiley & Sons, Inc., New York 16, N. Y. Fourth edition, 1957. 612 pages. Price $8.00.

Mr. Begeman has again brought his book, *Manufacturing Processes*, up to date, rewriting and expanding all its previous contents and modernizing his approach.

Three entirely new chapters appear: Manufacturing Processes, Metal Cutting, and Electroforming and Coating Processes. Conforming to recent developments, Mr. Begeman has revised all other chapters and particularly those on welding, heat treatment of steel, press work, plastic molding, melting and metal casting, and foundry equipment and procedures.

The text still serves as a thorough coverage of fundamentals of important manufacturing processes, engineering materials, and the modern machine tools necessary for processing these materials. The present edition, however, is less descriptive and places greater emphasis on basic aspects of materials and processes. Full explanations of the advantages and disadvantages of each process are provided.

Many new processes appear in the 1957 version of *Manufacturing Processes*. Professor Begeman now gives information on electroforming, electro-spark and ultra sonic machining, chem milling, and automation. He also covers CO_2 and shell molding, molding sands, non-ferrous casting materials, quality control, boring tools, and machining of hard materials. Recent equipment is amply represented in 166 new illustrations.

Chairman of the department of mechanical engineering at the University of Texas, Professor Begeman has an extensive professional and academic background, and is also on the staff of *The Tool Engineer*.

Organometallic Compounds

The Chemistry of Organometallic Compounds, by Eugene G. Rochow, Dallas T. Hurd, and Richard N. Lewis, John Wiley & Sons, Inc., New York 16, N. Y. 1957. 344 pages. Price $8.50.

The Chemistry of Organometallic Compounds makes available a modern review and critical survey of theory, structure and physical properties, preparation, chemical reactions, and applications.

The authors have organized their work on the basis of the general properties of the carbon-metal bond. Electronegativity and bond polarity have been used freely as indicative of the type of organometallic compound to be expected in a given instance. In their considerable use of Gilman's classical studies in this field, the authors have also included his valuable reactivity series.

Fluorinated organometallic compounds, "sandwich" and "bridge" compounds, organometallic complexions, and new pentaalkyl compounds of the Group 5 elements are among the topics of special interest included here. The authors also offer a unified treatment of typical and abnormal reactions with organic compounds, and discuss organometallic compounds in anionic polymerization—especially the Ziegler process for making polyethylene. Compounds of the Group II through VII elements are considered in addition to a variety of others.

Dr. Rochow is professor of chemistry at Harvard University. He is the author of *Introduction to the Chemistry of the Silicones* and co-author with M. K. Wilson of *General Chemistry*.

Dr. Hurd, author of the earlier Wiley book *Introduction to the Chemistry of the Hydrides* has been with the General Electric Company since 1943. He is now manager of advance development engineering for the lamp wire and phosphors department.

Dr. Lewis, like both co-authors, has also been with General Electric. Now associated with the Olin Mathieson Chemical Corp., he is in their film research and development department.

Measurements

Applied Electrical Measurements, by Isaac Fern Kinnard, John Wiley & Sons, Inc., New York 16, N. Y. 1956. 600 pages. Price $15.00.

This work covers theory, measurement of electrical quantities, and measurement of non-electrical quantities by electrical means.

A two-part volume, Part One covers the measurement of electrical quantities; Part Two treats the measurement of non-electrical quantities. Included also are chapters on the history, theory, and functional analysis of measurement, and a review of the state of applications in selected fields.

Other chapters in Part One discuss current and potential difference; resistance, inductance, capacitance, and storage factor Q; power and energy; phase angle, power factor, synchronism, and frequency; waveform; magnetism; transformers for measurement; and telemetering.

Part Two goes into the measurement of light, heat, sound, statics and kinetics, liquids and gases, and time.

"The book owes much of its value," writes Professor Charles L. Dawes in the Foreword, "to the fact that its author and his colleagues are actively engaged in the field, and have wide experience in research and in the development, manufacture, and applications of all types of measuring devices."

Applied Electrical Measurements is one of a series written by General Electric authors for the advancement of engineering practice.

Mr. Isaac Fern Kinnard, manager of engineering of General Electric's Instrument Department, was assisted by fourteen of his co-workers in preparing this broad study.

Solar Heating Passes a Test

The world's first solar-heated office building, located at Albuquerque, N. M., survived its initial winter trials "satisfactorily," it was revealed June 12 at a meeting of engineers in San Francisco. In a technical session dealing with methods of using the sun's heat for practical purposes, three New Mexico engineers said that a system installed in their own offices last year "performed satisfactorily through the worst part of the winter including a much cloudier than normal January."

The authors, F. H. Bridgers, D. D. Paxton and Roger W. Haines, added, however, that economic evaluation of their unit is not yet possible. They also listed some of the technical problems they had encountered, including corrosion of metal parts, freezing of water in the exposed area of the unit during the night and difficulties caused by air bubbles in the circulating system. The unit they described consists of an inclined "flat plate collector" which uses heat from the sun to raise the temperature of water. Heat from the water, stored in a 6000-gallon tank, is used, as needed, to warm the building.

Another technical paper presented at the same session as part of The American Society of Mechanical Engineers' semi-annual meeting, reviewed present use of the sun's heat to supply hot water for various uses. The author, Erich A. Farber, pointed out that many areas of the world, although lacking conventional fuels, have abundant sunshine which can be put to use economically.

In the United States, he said, almost all areas have enough sunshine to permit solar water heating for domestic use during the summer, but only limited regions have enough winter sun to permit economical year-round use of solar energy today.

A speaker scheduled for participation in a panel session on solar energy on June 12, B. L. Birchard of Hoffman Electronics Corporation, was quoted as saying that direct conversions of the sun's energy into electrical power has now become a practical reality, since economic barriers which have prevented widespread use of solar energy, are rapidly being destroyed.

Birchard placed particular emphasis on silicon converters, which can be used to charge special electric batteries. A solar-powered automatic radio repeater station has been installed for the U. S. Forest Service, he said, and work is progressing on units to power warning beacons in remote locations at sea.

Birchard said that improved storage batteries are now available to store electricity generated during the day for night use. With today's equipment, he said, enough energy to supply the average household could be obtained from a set of "silicon converters" only 36 inches square installed on the roof of a house. The efficiency of these converters is now being improved, he added, and their cost being substantially reduced, so that in remote regions where fuel is expensive, the use of solar energy is now economically feasible.

ARBA Is Growing

The American Road Builders Association is steadily broadening the scope and increasing the work of its 26 technical committees.

The newest of the committees, now being formally organized, are those pertaining to airport pavements and flexible type pavements. The former group is under the chairmanship of Henry J. Lichtefeld, chief of the technical branch of the Civil Aeronautics Administration; the latter is chaired by D. D. Woodson, staff engineer of the Asphalt Institute, College Park, Md.

Three relatively new committees, all unusually active now, are those dealing with photogrammetry, highway illumination and electronic computers. One of the busiest and most interesting of all of the groups is the committee on roadside construction and maintenance.

ARBA's Committees work continuously through the year probing new techniques in roadbuilding; analyzing and evaluating developments; and reporting back, at intervals, to the entire highway industry.

News of Engineers

James W. Barnett, MWSE, has been appointed manager of the Australian Division of Lindberg Engineering Company. He will make his headquarters at the Lindberg plant in Melbourne, where he will assume responsibility for sales and production of the complete Lindberg line of metal heat treating and melting furnaces, induction heating equipment, and ceramic kilns in the South Pacific area. Barnett has been associated with the Lindberg organization for an aggregate of eight years in various engineering and sales capacities. Prior to his new assignment, he was chief estimator of Lindberg Industrial Corporation, the field-erected equipment division of Lindberg.

* * *

Alfred A. Rodick has been appointed chief engineer for G. Felsenthal and Sons, Inc., Chicago plastics fabricating and injection molding firm. Rodick was formerly chief engineer for the Molded Products Division of the Admiral Corporation. Prior to that, he was an engineer for Chicago Molded Products.

Rodick was educated at St. Xavier University in Cincinnati and Illinois Institute of Technology. A World War II veteran of the 8th Air Force in the European Theater of Operations, Rodick lives in Lombard, Illinois, with his wife and two daughters.

* * *

Four new instructors have been appointed to the staff of Illinois Institute of Technology, Chicago, effective Sept. 1.

They are Demetrios P. Kanellakos, electrical engineering; Julian Snyder, civil engineering; Robin A. D. Walker, architecture, and Tsih C. Wang, electrical engineering.

Kanellakos, now a graduate assistant in electrical engineering at IIT, is a native of Tripolis, Greece. He received both his bachelor's and master's degrees in electrical engineering at Illinois Tech.

At present Kanellakos is working toward a Ph.D.

Snyder also received both his bachelor's and master's degrees in civil engineering from Illinois Tech. He has worked as a structural designer for several engineering firms.

He has been a graduate assistant at IIT from 1949-1951. He also taught in the civil engineering evening division in the spring and 1956 and 1957.

Walker, a native of Ireland, was graduated from University College in Dublin. He also studied under LeCorbusier and at l'Ecole des Beaux-Arts, Paris.

He received a French Government scholarship in 1947 and a 1956-1957 Fulbright Scholarship.

He has been a senior assistant architect for Michael Scott in Dublin, and MacGillivray and Son in Southern Rhodesia.

Wang was graduated from the National Central University in Nanking, China, and received his master's degree in electrical engineering from Illinois Tech.

He has been an assistant engineer for the Taiwan Power Co. on Formosa from 1949-1954.

* * *

Albert H. Foster has been named vice-president and director of the New York office of Lester B. Knight & Associates, Inc. Foster recently resigned as president of Mead Carney & Company, Inc., and vice-president and director of First Research Corporation, to join the Knight organization.

Shippingport Solves Problems

Building the nation's first utility nuclear generating station at Shippingport, Pa., has presented many new problems —some that have been solved by rather unorthodox methods, reports *Engineering News-Record.*

As a prime example, the roof or top slab of the vapor container enclosure is concrete, five feet thick. This slab is some 60 feet above the base and could not be supported by the vapor container itself. To support the freshly placed concrete of these slabs on conventional forms would have required massive falsework. Instead precast roof sections, two feet thick and weighing 10-to-20 tons were constructed. After curing, they were hoisted into place, with a maximum clearance of one inch when placed on the previously poured wall and haunch sections. After grouting into place, these precast slabs became, in effect, forms for the additional three feet of concrete necessary to make up the total thickness.

A second unusual feature of the Shippingport Atomic Power Station is the large amount of reinforcing steel that has gone into it. So much was used throughout, and to such an extent, that the average slab will show approximately 200 pounds of steel per cubic yard of concrete, as compared with the normal ratio of 80-90 pounds per cubic yard. The total concrete estimated for the complete plant is 50,000 cubic yards with about 5,000 tons of reinforcing steel to be used, the magazine states.

An extremely tight schedule was set up and has been followed from the start of construction. To maintain progress, concreting proceeded throughout the Winter. To prevent freezing and to provide adequate curing, a low-pressure boiler was brought in, and saturated steam was piped under the canvas enclosures over all the fresh pours.

Water presented another problem. Excavation for the turbine room foundation uncovered a 15-foot blanket of wet clay. It was excavated and some 25,000 cubic yards of gravel were used to backfill, providing adequate support for the 12-foot-thick turbine room mat.

The plant's capacity is 60,000 kw, obtained by operating three of the four steam generators. The plant's single turbine-generator has a maximum capability of 100,000 kw, to allow for possible improvement in heat energy output, the magazine states.

On Labor Day, 1954, President Eisenhower made history when he waved the wand which, by remote control, started the first bulldozer on the Shippingport site. Full-scale construction activity started in March, 1955. Now, after nearly two years, in which all the new construction problems were met and solved, "Shippingport" is almost a reality.

U. of T. Students Hold Power Show

The Forty-Eighth Annual Exposition and Power Show of the University of Texas was held Friday evening, May 3, 1957, from 6 P.M. to 10 P.M. on the campus at Austin. All visitors were cordially invited and encouraged to attend.

All the departments of the College of Engineering, College of Pharmacy, the Home Economics Department, and the Army, Navy, and Air Force R.O.T.C. units combined their efforts to provide an educational and interesting display of equipment and techniques employed in training the modern student in these fields. Exhibits ranging from the serious and technical to the extremely imaginative served to express the ingenuity of the students presenting the various displays.

WSE Applications

In accordance with Article I, Section 5 of the By-Laws of the Western Society of Engineers, there is published below a list of applicants for admission received since the last issue of the Midwest Engineer:

C. E. Evanson, President, TAB Engineers, Inc., 767 Milwaukee Av.

William Mark, Sales Engr., Mississippi Valley Structural Steel Co., 111 W. Washington St.

Michael J. O'Laughlin, Manager, Sutherland Engineers, 222 W. Adams St.

Chris S. Platis, Elect'l. Draftsman & Checking, Automatic Electric Co., mail: 2058 N. Cleveland Av.

John W. Rogers, Vice Pres. & Treas., Bates & Rogers Construction Corp., 600 W. Jackson Blvd.

John M. Ruffner, Regional Sales Mgr., Fenwal, Inc., 6525 W. North Av., Oak Park, Ill.

Ola A. Svennes, Chas. W. Cole & Son, mail: 13240 Avenue "F".

T. W. Spilman, District Engineer, Bethlehem Steel Co., Prudential Plaza.

Thomas Yamashita, Regional Mgr., Intrusion-Prepakt, Inc., 80 E. Jackson Blvd.

John W. Braze, Vice Pres., Mid-West Dynamometer & Engineering Co., mail: 339 Edgemont Lane, Park Ridge, Ill.

Ira G. Lenard, Prod. Suprvr., S & C Electric Co., 4435 N. Ravenswood.

Jose M. Lenone, Designing Engr., Chicago District, Corps of Engineers, mail: 4932 Lake Park Av.

D. W. Lloyd, Assistant Mgr., Chicago Dist., Youngstown Sheet & Tube Co., East Chicago, Ind.

Walter J. Oliver, Layout Engr., Automatic Transportation Co., mail: 9700 S. Emerald Av.

James D. Piper, Vice Pres., Portland Cement Assn., mail: 136 Tudor Pl., Kenilworth, Ill.

C. J. Price, Assist. Supt. Defense Projects, Western Electric Co., mail: PO Box 1540, Fairbanks, Alaska.

Howard P. Ritsch, President, Process Development Co., mail: 8925 S. Laflin St.

M. Sabanas, Design Engr., Armour Research Foundation, mail: 3330 W. 61st St.

James Smith, Engineer, Keystone Railway Equipment Co., mail: 3314 W. 62nd St.

Frederick W. Wurtzell, Technical Repre., Bakelite Company, 230 N. Michigan Av.

George E. Dammann, Engineer, Commonwealth Edison Co., 72 W. Adams St.

Ernest A. Kinney, Engineer, Middle West Service Co., 20 N. Wacker Dr.

William L. Ryan, Highway Engr. III, Cook County Superhighway Dept., mail: 1718 W. 106th St.

John P. Urbain, Project Engr., Peter J. Crowley Co., PO Box 744, Maywood, Ill.

Charles S. Anderson, Engineer, Knott & Nielly, Inc., 7724 S. Racine Av.

A. Benesch, Senior Partner, Alfred Benesch & Associates, 111 W. Jackson Blvd.

Frederick D. Furber, Vice Pres. (Operation), Breuer & Curran Oil Co., 185 N. Wabash Av.

O. G. Hessler, Electronics Engr., Sears, Roebuck & Co., 925 S. Homan Av.

J. Fred Howe, Zone Manager, Delco Products Div., G. M. Corp., mail: 3430 W. Division St.

Roy C. Jochim, Elect. Mtce. Foreman, Electro-Motive Div. of G. M., mail: 2450 Spruce St., River Grove, Ill.

George A. Kennedy, Principal, George A. Kennedy & Associates, mail: 20 E. Huron St.

Charles J. Kolar, Mech. Engr., Joanna Western Mills Co., mail: 3221 Park Av., Brookfield, Ill.

Bennett C. Larson, John F. Meissner Engineers, Inc., mail: 6438 N. Sacramento Av.

Hrone S. Makredes, Dist. Mgr., Intrusion-Prepakt, Inc., 80 E. Jackson Blvd.

P. P. Stathas, Senior Partner, Duff and Phelps, 208 S. LaSalle St.

C. E. Wheeler, Engr. of Plant Operation, Metropolitan Sanitary Dist. of Greater Chicago-Calumet, 400 E. 130th St.

Henry Toennies, Dev. Engr., National Concrete Masonry Assn., 38 S. Dearborn St.

Edward H. Aldworth, 1 Clarendon Av., San Francisco 14, Cal.

Lewis C. Alk, Mgr.-Tech. Serv. Dept., J. B. Clow & Sons, Inc., PO Box 6600-A.

George V. Campbell, Vice Pres., The Ramtite Co., mail: 752 Leesley Rd., Riverside, Ill.

Jerome J. Kizior, Mgr. & Metallurgist, Mercury Aluminum Casting & Engineering Co., mail: 1234 S. 58th Av., Cicero, Ill.

L. F. Lang, Dist. Mgr., Western Precipitation Corp., 1 N. LaSalle St.

Vaughn Mansfield, Chief Engr., Peabody-Southern Coal Co., Prudential Plaza.

Clayton F. Paschen, Assist. Ch. Engr., Cook County Highway Dept., 130 N. Wells St.

Murray J. Paul, Chief Engr., Natural Gas Pipeline, 122 S. Michigan Av.

A. K. Salamek, Struct'l. Engr., Naess & Murphy, 80 E. Jackson Blvd.

R. S. Terhune, Sales Repre., Nelson Electric Mfg. Co., 333 N. Michigan Av.

Walter R. Zimmerman, Engineer, Commonwealth Edison Co., mail: 233 Traver Av., Glen Ellyn, Ill.

Thomas J. Barkley, Sales Engineer, General Electric Co., 201 N. Wells St.

Matthew Hughes, Jr., Verification Engr., mail: 1533 N. Linder Av.

James E. Murray, Distribut'n. Engr., Westinghouse Electric Corp., Merchandise Mart Plaza.

Fred I. Palmer, Engr. (Promotion), American Vitrified Products Co., mail: 1947 Kiest Av., Northbrook, Ill.

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Stan M. Vesely, Superv'g. Engr., Chicago Electric Co., mail: 2243 61st Court, Cicero, Ill.

N. E. Bateson, Deputy Director, Pullman-Standard Car Mfg. Co., 1414 Field St., Hammond, Ind.

John T. Ellis, Jr., Chief Engineer, Hanna Engineering Works, 1765 N. Elston Av.

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James E. Reuter, Elect. Engr., Vern E. Alden Co., 33 N. LaSalle St.

Carl W. Westphal, Struct. Engr.; Consoer, Townsend & Associates, mail: 5331 Arcadia St., Skokie, Ill.

James F. Wolfe, Civil Engineer, Portland Cement Assn., 111 W. Washington St.

Joseph E. Drapeau, Jr., Technical Director, Glidden Co., mail: 248 Vine St., Hammond, Ind.

Cliff H. Keho, Lecturer, Civil Engrg., Northwestern University, Evanston, Ill.

Donald G. Schultz, Chief Engineer, Wedron Silica Co., 135 S. LaSalle St.

Eugene A. Bartkus, Assist. Chief Engr., John F. Meissner Engineers, 300 W. Washington St.

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Donald E. Stage, Jr., attending Univ. of Illinois, mail: 5119 W. Van Buren St.

Thomas J. Steskal, attending Univ. of Illinois, mail: 2407 Forest View Av., River Grove, Ill.

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Miss Margaret G. Coyne, Public Relations, U. S. Govt., Dept. of H., E. & W., Old PO Box 1944.

George F. Kremm, President, Chem-Met Corp., 16 E. Ontario St.

Harry F. Ritterbusch, Reg. Operation Mgr., American Optical Co., 10 S. Wabash Av.

W. M. Sikkema, Sales Engr.-Struct. Fabr., J. T. Ryerson & Son, Inc., Box 8000-A.

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Granger Calls for Administrators

"Rather than treat administrative work as something below the dignity of a good scientist," the geologic profession should encourage the development of administrators, Arthur E. Granger, manager of the Salt Lake Area Office of the Atomic Energy Commission, urged in New Orleans on Feb. 28 upon the national meeting of the American Institute of Mining, Metallurgical and Petroleum Engineers. Granger, who is a geologist, also took occasion to caution young geologists that few can rise to the top of the profession by restricting their work to a 40-hour week.

His paper said in part:

"Time and attendance are often a bone of contention for geologists, since most geologists work long and irregular hours in the field and are subject to the usual problems of 'scientific thinking' in the preparation of reports, they are resentful of clock-punching habits in the office. Supervisors will find that to be dogmatic about a man being present during exact office hours will usually result in less output than one who is allowed reasonable freedom of time. The important thing is results. In other words, scientific personnel need freedom of action as well as thought. Those who abuse this freedom are not desirable professional people anyway and can be released, and those who are given it will produce more in the long run.

"There has been a very disturbing trend among younger geologists to try to adjust geologic work to the standard 40-hour week. This is due in part to basic trends throughout industry and government and in part to management insistence on adhering to time and attendance schedules. Few, if any, will rise to the top of the profession on a 40-hour week.

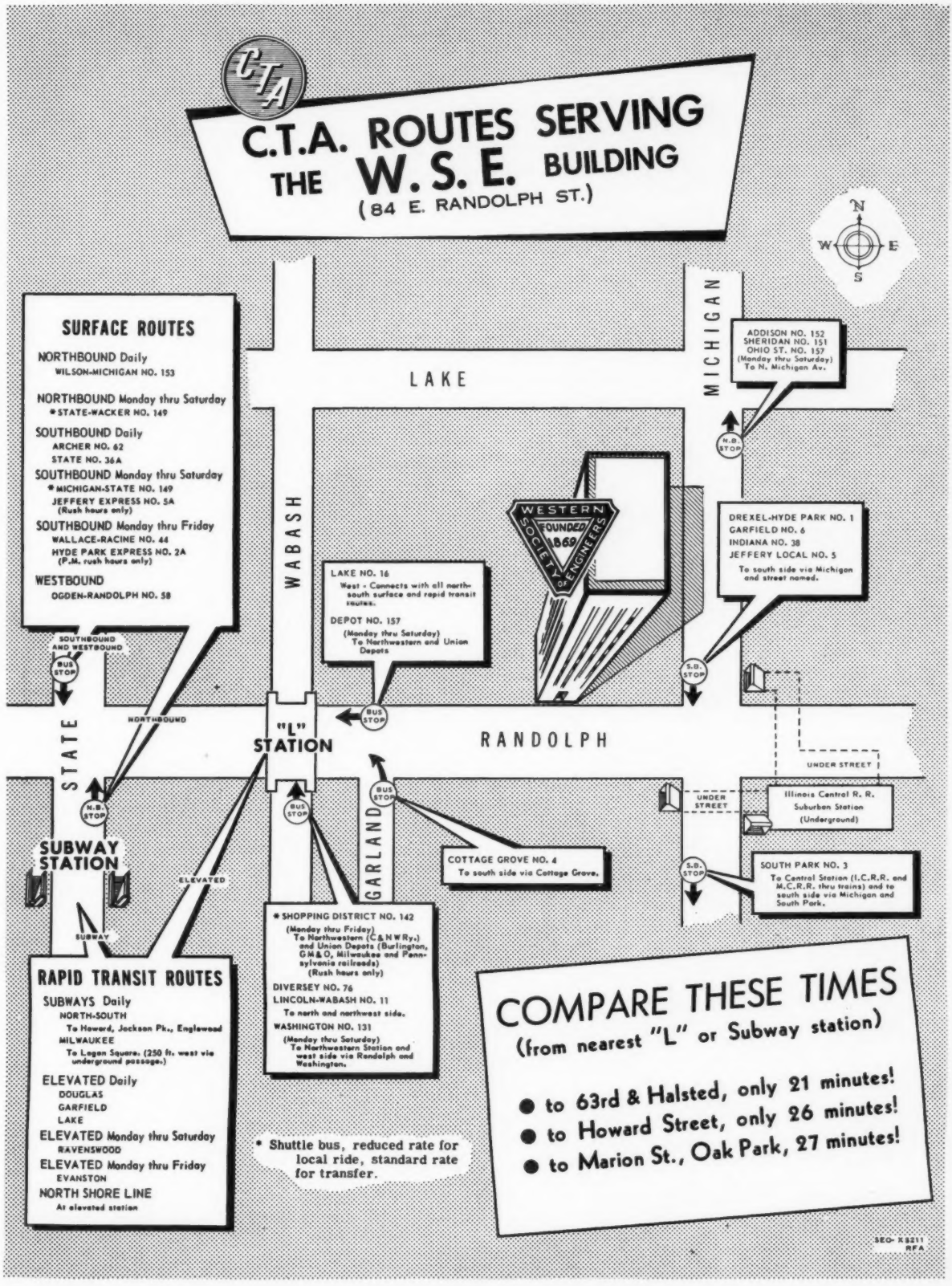
"A geologist who has demonstrated that he can do a good job of administration should take pride in the fact that he probably has contributed far more to his science by virtue of having made it possible for many other geologists to make contributions that would far outweigh what he could do as an individual.

"The geologic profession itself should be more generous in its recognition of persons who devote themselves to administrative work and who thus make it possible for the profession to advance at a greater rate. The profession should encourage the development of such people rather than treat administrative work as being something below the dignity of a good scientist.

"The rewards of administrative work are many, though few of them are in the nature of scientific acclaim. However, great satisfaction can come from seeing the proper development of a young scientist, seeing an efficient scientific program produce results and having people happy in their work and personal lives."

Old Cures Are Good

Maybe Grandmother had the right idea with some of her home remedies, and maybe the tribal witch doctor with his mysterious herbs was on the right track after all, reports *Chemical Week.* That, at least, is the opinion of a growing number of pharmaceutical research groups who have begun systematically examining the old "cures" in the hope of turning up potent new drugs.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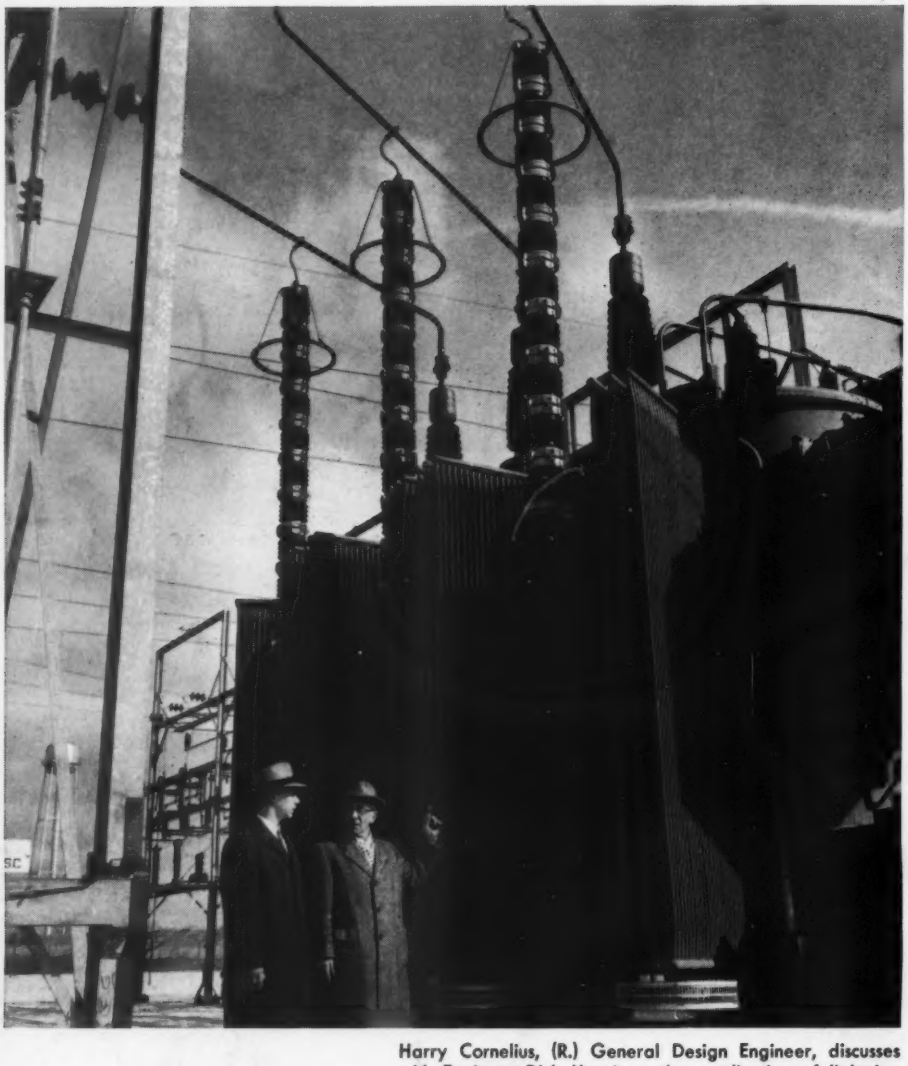
UNDER STREET
Illinois Central R. R. Suburban Station (Underground)
SUBWAY STATION
ELEVATED
SUBWAY
COTTAGE GROVE NO. 4
To south side via Cottage Grove.
SOUTH PARK NO. 3
To Central Station (I.C.R.R. and M.C.R.R. thru trains) and to south side via Michigan and South Park.
*SHOPPING DISTRICT NO. 142
(Monday thru Friday)
To Northwestern (C&NWRy.) and Union Depots (Burlington, GM&O, Milwaukee and Pennsylvania railroads)
(Rush hours only)
DIVERSEY NO. 76
LINCOLN-WABASH NO. 11
To north and northwest side.
WASHINGTON NO. 131
(Monday thru Saturday)
To Northwestern Station and west side via Randolph and Washington.
RAPID TRANSIT ROUTES
SUBWAYS Daily
NORTH-SOUTH
To Howard, Jackson Pk., Englewood
MILWAUKEE
To Logan Square. (250 ft. west via underground passage.)
ELEVATED Daily
DOUGLAS
GARFIELD
LAKE
ELEVATED Monday thru Saturday
RAVENSWOOD
ELEVATED Monday thru Friday
EVANSTON
NORTH SHORE LINE
At elevated station
* Shuttle bus, reduced rate for local ride, standard rate for transfer.
COMPARE THESE TIMES
(from nearest "L" or Subway station)
● to 63rd & Halsted, only 21 minutes!
● to Howard Street, only 26 minutes!
● to Marion St., Oak Park, 27 minutes!
SEO- X5211 RFA

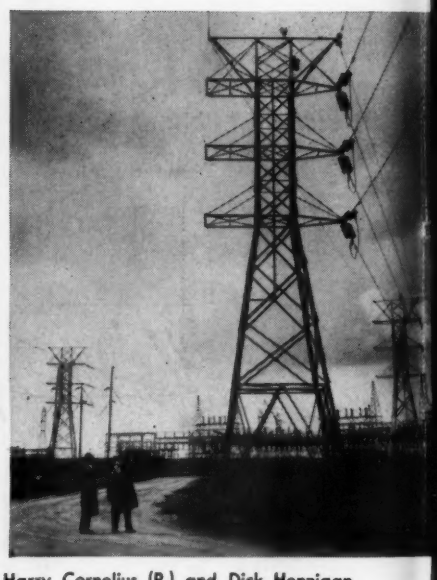
Engineering news from Commonwealth Edison

How to get along with lightning



Harry Cornelius, (R.) General Design Engineer, discusses with Engineer Dick Hennigan the application of lightning arresters to high voltage transformers so as to provide the most effective protection.

SEARCHING ON THE FRONTIER OF KNOWLEDGE



Harry Cornelius (R.) and Dick Hennigan discuss the protection of transmission lines against lightning strokes by means of shield wires above the conductors.

Lightning is a natural phenomenon which, throughout the world, will lash out from the clouds 1,000 times in the next ten seconds.

Man has always been aware of its existence, but he wasn't sure of its electrical nature until Ben Franklin flew his kite. In fact, it hasn't been too long since it left the folklore stage.

Engineers have for some time, however, been diligently engaged in studying the characteristics and mechanism of lightning and its associated phenomena. Their big job is to find ways to protect against its destructive power. Currents as high as 200,000 amperes have been recorded. This means that associated voltages are in the millions.

To protect the far-flung Edison system even more fully against this awesome "Fire from Heaven," Edison engineers are constantly searching for better methods of protection.

This is another example of their opportunity to contribute toward maintaining dependable electric service for the six million people in Northern Illinois.

Partners in Progress for over 70 years

Commonwealth Edison
AND
Public Service Company